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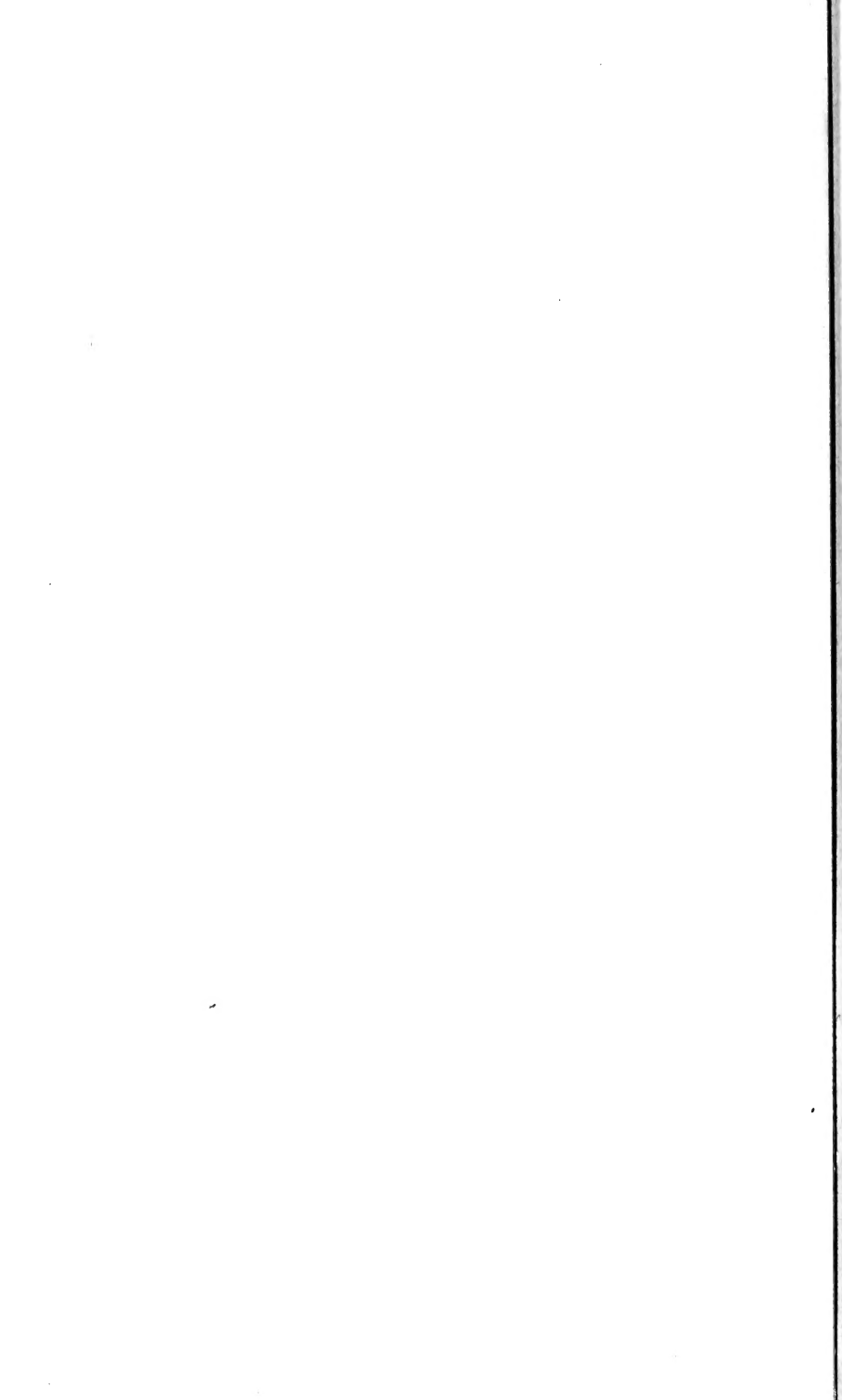
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THE

FIFTIETH ANNUAL REPORT

OF THE

BOARD OF DIRECTORS

OF THE

ZOOLOGICAL SOCIETY

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CAMBRIDGE, MASS.

OF PHILADELPHIA.

(INCORPORATED MARCH 21ST, 1859.)

READ AT THE ANNUAL MEETING OF THE MEMBERS AND LOAN
HOLDERS OF THE SOCIETY.

APRIL 27th, 1922.

PHILADELPHIA:
PRESS OF ALLEN, LANE & SCOTT,
1211-1213 Clover Street,
1922.

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THE
ZOOLOGICAL SOCIETY OF PHILADELPHIA.

(FAIRMOUNT PARK.)

BOARD OF DIRECTORS.

ELECTED BY THE SOCIETY.

CHARLES B. PENROSE, M.D., <i>President.</i>	ROBERT G. LE CONTE, M.D., HENRY PRATT McKEAN, CLEMENT B. NEWBOLD, CHARLES S. W. PACKARD, <i>Treasurer.</i>
CHRISTIAN C. FEBIGER, <i>Vice-President.</i>	
CHARLES M. LEA, THOMAS DeWITT CUYLER, OWEN WISTER, D. M. BARRINGER,	GEORGE L. HARRISON JR., ALFRED GRATZ, RICHARD H. HARTE, M.D., WILLIAM L. ABBOTT, M.D., WILSON CATHERWOOD, B. DAWSON COLEMAN, WITMER STONE, D. Sc.
W. B. CADWALADER, M.D., <i>Secretary.</i>	

ELECTED BY THE CITY COUNCIL.

GEORGE CONNELL.

SUPERINTENDENT OF THE GARDEN.

C. EMERSON BROWN.

CLERK.

F. ROBERT GILPIN.

PATHOLOGIST.

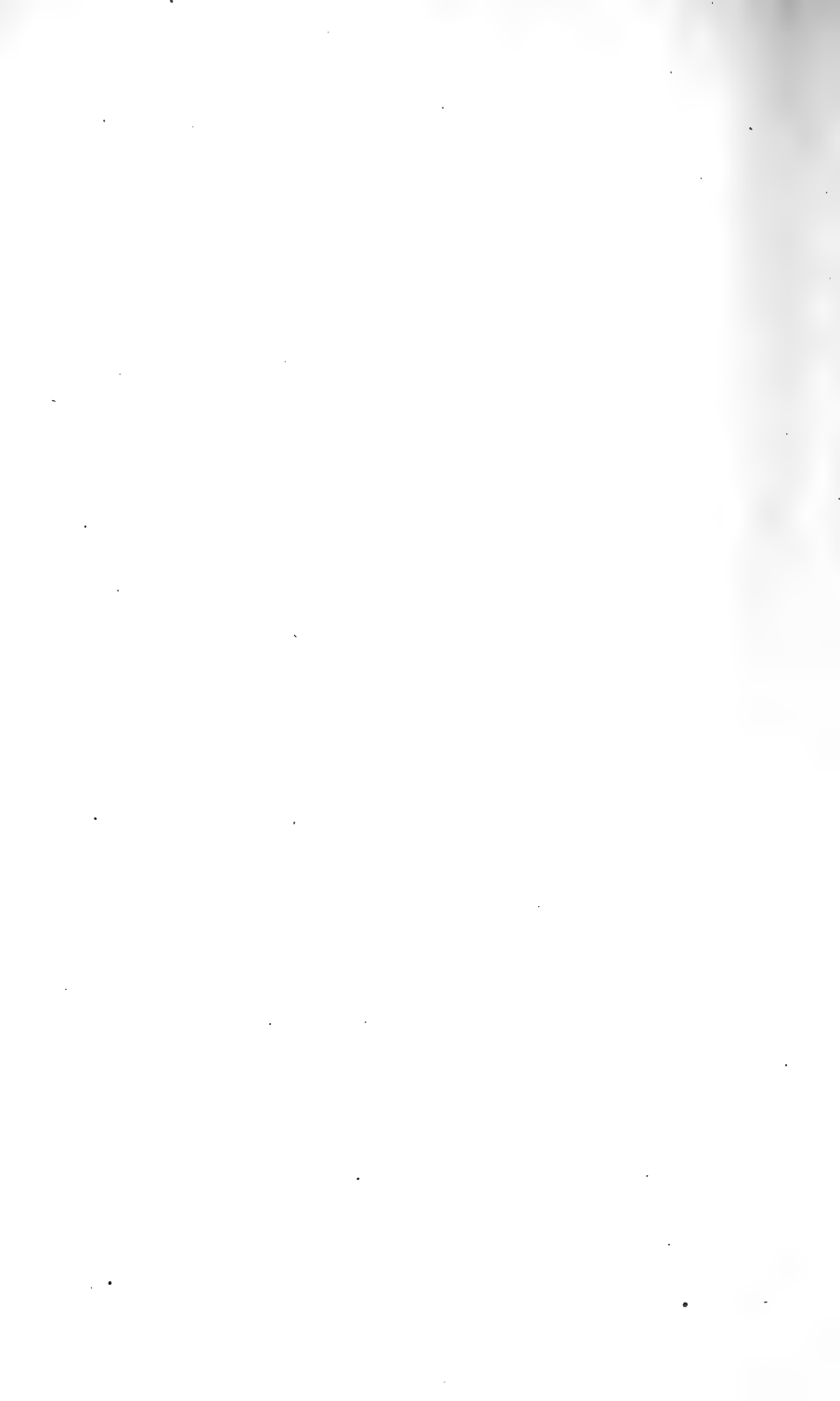
HERBERT FOX, M.D.

ASSISTANT PATHOLOGISTS.

FRED D. WEIDMAN, M.D., E. P. CORSON-WHITE, M.D.

SOLICITOR.

JAMES COLLINS JONES.



REPORT

OF THE

BOARD OF DIRECTORS.

PHILADELPHIA, April 27th, 1922.

The Board of Directors of the Zoological Society of Philadelphia presents to the members and loanholders its fiftieth annual report, for the year ending February 28th, 1922.

GENERAL AFFAIRS AND FINANCES.

The number of members at the close of the year was:—

Annual members.....	128
Life members.....	926
Honorary members.....	8
Perpetual memberships.....	242
Junior members.....	29
	1,333
Total members.....	1,333

The following is a report in detail of the admissions and receipts for the year:—

Adults (paying at gates).....	212,314
Children (paying at gates).....	79,879
Members (including life and annual members, loanholders' annual, and complimentary an- nual tickets).....	1,631
Loanholders' single tickets.....	6,547
Free admissions (charitable institutions, donors' tickets, &c.)*.....	4,525
	304,896

* In addition to these 200,000 tickets were issued for the admission of pupils of the Philadelphia Schools.

Monthly Record of Receipts from Admissions for 1921-1922, with corresponding account for 1920-1921.

MONTH	1920-1921	1921-1922	COMPARISON
March.....	\$4,252.05	\$8,090.15	Increase \$3,838.10
April.....	7,098.65	8,154.35	Increase 1,055.70
May.....	14,286.30	12,012.95	Decrease 2,273.35
June.....	11,074.65	9,285.70	Decrease 1,788.95
July.....	16,294.35	9,198.55	Decrease 7,095.80
August.....	18,332.40	12,270.25	Decrease 6,062.15
September..	19,019.00	9,153.85	Decrease 9,865.15
October.....	14,828.65	8,540.95	Decrease 6,287.70
November..	4,671.10	3,469.15	Decrease 1,201.95
December...	3,226.30	1,969.45	Decrease 1,256.85
January....	5,257.55	1,825.65	Decrease 3,431.90
February...	3,047.85	2,354.75	Decrease 693.10
	\$121,388.85	\$86,325.75	Decrease \$35,063.10

Total receipts from admissions for the year show a decrease when compared with the preceding year; yet they are much greater than during the fiscal year 1919-1920, which, up to that time, were the largest in the history of the Gardens. Therefore your Board feels that the decrease of this year was not entirely unexpected, for it merely represents the reaction after an abnormally prosperous period that existed throughout the country. As was pointed out in the report of 1921, the cost of maintenance has continued to increase, but this has been in part offset by great reduction in the expenditures for subsistence, due to the reductions in prices of food stuffs. Because of the unsettled conditions of the building trade, few permanent improvements were undertaken. However, of the more important ones, a series of pheasant enclosures were erected. The regular repairs have been completed as heretofore.

The expenditure for animals was not as great as last year; nevertheless, there were exhibited 3270 specimens, which is slightly greater than during the preceding year. Of these, 33 species have never been exhibited in the collection before. The losses from death were not greater than usual. The information gained through the work of the staff in the laboratory continues to be of the utmost value in determining problems that constantly arise in the care of animals.

In November members of the American Ornithological Union, while holding their meeting in Philadelphia, were entertained by the Society at the Gardens.

Your Board announces with deep regret the death, in April 1921, of Mr. W. W. Montgomery, who had served as solicitor to the Society since 1876.

At the meeting of the Board held in May 1921, Mr. James Collins Jones was elected to succeed Mr. Montgomery as solicitor.

TREASURER'S REPORT.

INCOME AND EXPENDITURES.

For the fiscal year ending February 28th, 1922.

INCOME.

Admission receipts.....	\$86,325.75
Rents at Garden.....	1,500.00
Interest.....	3,251.13
Sale of animals.....	794.50
Sale of guides.....	476.50
Sale of souvenir booklets.....	122.70
Sale of souvenir post cards.....	138.20
Donkey rides.....	1,924.60
Sundry receipts.....	2,072.17
Donation.....	10.00
Received from the City of Philadelphia through the Commissioners of Fairmount Park.....	50,000.00
Total income.....	<u>\$146,615.55</u>

EXPENDITURES.

Salaries.....	\$42,526.25
Office expenses.....	1,547.30
General expenses.....	73,966.79
Purchase of animals.....	9,472.73
Permanent improvements.....	7,962.98
Transferred to Emergency Fund....	11,500.00
Total expenditures.....	<u>\$146,976.05</u>
Excess of expenditures over income.....	360.50
	<u>\$146,615.55</u>

F. ROBERT GILPIN,
Clerk of the Society.

C. S. W. PACKARD,
Treasurer.

Audited and found correct, April 26, 1922.

STOCKTON BATES & SONS.

TOTAL NUMBER OF ANIMALS EXHIBITED
IN EACH CLASS DURING THE YEAR.

MAMMALS.....	611
BIRDS.....	1,522
REPTILES.....	1,070
AMPHIBIANS.....	67
	3,270

Species that have never before been exhibited in the collection are:

Silver Gibbon, *Hylobates leuciscus*, (Geoffroy).

Hab., Java.

One by purchase October 23rd.

White-necked Raven, *Corvus cryptoleucus*, Couch.

Hab., Deserts of S. W. United States and Mexico.

One presented February 25th.

Shaft-tailed Magpie, *Cryptorhina afra*, Linn.

Hab., N. E. Africa and Senegambia.

Two by purchase April 19th.

We were fortunate in securing these rare specimens, this being one of the first two pairs ever received in this country alive.

Red-tailed Oriole, *Oriolus trailli*, McClell.

Hab., Himalayan Mountains.

One by purchase May 17th.

Black-fronted Blue Tanager, *Procnopis vassori*.

Hab., Northern South America.

Two by purchase May 17th.

Black-headed Tanager, *Calliste cyanoptera*, Bp.

Hab., Venezuela and Northern Colombia.

Two by purchase April 20th.

Yellow-throated Finch, *Phonipara pusilla*, Scl.

Hab., Mexico; Central America; Panama to Colombia.

Four by purchase April 20th.

Pileated Finch, *Coryphospingus pileatus*, (Neuweid).
Hab., Brazil to Venezuela and Colombia.

One by purchase May 20th.

South American Cardinal, *Cardinalis phæniceus*, Bp.
Hab., Venezuela, Trinidad and Colombia.

Two by purchase August 11th.

Meadow Pipit, *Anthus pratensis*, Bechst.

Hab., Europe.

One by purchase June 7th.

Javan Titmouse, *Parus cinereus*, Bonn.

Hab., India.

Two by purchase May 17th.

Yellow-crested Titmouse, *Parus sylonotus*, Blyth.

Hab., Northern India.

One by purchase May 17th.

Swainson's Bush Shrike, *Dryoscopus rufiventris*, Heugl.

Hab., South Africa.

One by purchase October 7th.

Swainson's Yellow-legged Thrush, *Turdus flavirostris*,
(Swain).

Hab., West Coast of Mexico.

Two by purchase March 19th.

Noisy Chat-Thrush, *Cossypha bicolor*, Grill.

Hab., South Africa.

One by purchase October 7th.

Jardine's Babbler, *Crateropus jardinii*, Smith.

Hab., South Africa.

Two by purchase October 7th.

Baillon's Toucanet, *Andigena bailloni*, Gould.

Hab., South-east Brazil.

One by purchase November 8th.

This is a very rare specimen and we were fortunate
in securing it.

Yellow-billed Green Toucan, *Aulacorhamphus calohynchus*, Gould.

Hab., Andes of Venezuela to Northern Colombia.
One by purchase May 20th.

South American Burrowing Owl, *Speotyto cunicularia*, Ridgway.

Hab., Northern South America.
Two by purchase August 11th.

Although this bird is common in South America, we have never before had it in the collection. It seems to thrive very well in captivity.

South American Pigmy Owl, *Glaucidium phalaenoides*, Daud.

Hab., Trinidad, Venezuela and Guiana.
Two by purchase August 11th.

Red-shouldered Conure, *Conurus chloropterus*, Sclat.

Hab., San Domingo.
One by purchase October 7th.

Egyptian White Vulture, *Neophron percnopterus*, Savign.

Hab., India, Africa and Southern Europe.
Two by purchase May 17th.

Pileated Francolin, *Francolinus sephæna*, Newton.

Hab., South Africa.
Three by purchase October 7th.

Manchurian-eared Pheasant, *Crossoptilon auritum*, Gray.

Hab., Northwest China.
Two by purchase August 31st.

Impeyan Pheasant, *Lophophorus impeyanus*, Lath.

Hab., Chamba, South Kashmir.
Two by purchase October 12th.

Sonnini's Quail, *Eupsychortyx sonnini*, Gould.

Hab., Northern South America.
Four by purchase August 11th.

Brush Bronze-winged Pigeon, *Phaps elegans*, Selby.
Hab., South Australia and Tasmania.

Two by purchase October 7th.

Coromandel Plover, *Cursorius coromandelicus*, Gray.
Hab., Indian Peninsula and Ceylon.

One by purchase June 7th.

Red-wattled Plover, *Sarcogrammus indicus*, Reich.
Hab., Persia to Ceylon.

Two by purchase June 7th.

Ringed Plover, *Ægialitis hiaticula*, Linn.
Hab., British Isles.

One by purchase June 7th.

Florida Black Duck, *Anas fulvigula fulvigula*, Ridgway.
Hab., Florida to Louisiana.

Two by purchase September 23rd.

Zebra-tailed Lizard, *Callisaurus draconoides*, Blainville.

Hab., Southwest United States.

One by purchase August 14th.

Orcutt's Spiny Lizard, *Sceloporus orcutti*, Stejneger.
Hab., Southwest California.

Two by purchase June 13th.

Animals that were born in the garden during the year were:

2 green monkeys (*Cercopithecus callitrichus*) ♀ April 28th; ♂, May 10th.

1 pig-tailed macaque (*Macacus nemestrinus*) June 15th.

4 rhesus macaques (*Macacus rhesus*) April 3rd; May 23rd and 25th; July 8th.

2 pumas (*Felis concolor*) ♂ and ♀, June 8th.

4 prairie dogs (*Cynomys ludovicianus*) May 14th.

1 woodchuck (*Arctomys monax*) May 27th.

29 waltzing mice (*Mus wagneri rotans*) March 4th; April 22nd; May 1st and 20th; October 14th; December 29th; January 11th.

- 1 spotted cavy (*Cælogenys paca*) July 16th.
- 1 zebu (*Bos indicus*) ♂, July 4th.
- 1 Indian buffalo (*Bos bubalis*) ♀, May 21st.
- 3 American bison (*Bison bison*) ♀, May 29th; ♂, November 1st; ♀, November 26th.
- 1 Indian antelope (*Antilope cervicapra*) ♂, May 28th.
- 3 Himalayan tahrs (*Hemitragus jemlaicus*) ♂s, May 5th; June 12th and 22nd.
- 4 aoudads (*Ovis tragelaphus*) ♂s, April 24th and 28th; May 13th and 16th.
- 1 urial (*Ovis vignei*) April 11th.
- 2 red deer (*Cervus elaphus*) May 22nd and 27th.
- 4 fallow deer (*Cervus dama*) ♂s, June 14th, 19th and 21st; August 16th.
- 1 axis deer (*Cervus axis*) ♀, November 12th.
- 3 hog deer (*Cervus porcinus*) ♂s, March 13th and May 20th; ♀, November 19th.
- 3 Japanese sika deer (*Cervus sika typicus*) ♀, May 31st; ♂s, June 3rd and 10th.
- 1 llama (*Lama glama*) ♂, February 4th.
- 1 hippopotamus (*Hippopotamus ampibiuis*) ♂, February 4th.
- 1 vulpine phalanger (*Trichosurus vulpecula vulpecula*) June 9th.
- 3 silver pheasants (*Gennæus nycthemerus*) April 28th.
- 2 eastern wild turkeys (*Meleagris gallopavo*) May 15th.
- 3 herring gulls (*Larus argentatus*) June 17th.
- 5 muscovy ducks (*Cairina moschata*) September 15th.
- 19 common garter snakes (*Thamnophis sirtalis sirtalis*) August 21st.

LIST OF ADDITIONS TO THE COLLECTION FOR THE YEAR ENDING
FEBRUARY 28TH, 1922.

- 1921.
- Mar. 2. 4 cape hyrax, 1 anubis baboon, 1 Guinea baboon, 2 quail finches and 2 common
bulfinches purchased.
4. 7 waltzing mice born in the garden.
6. 1 alligator presented by Wm. C. Manz, Philadelphia.
8. 1 song sparrow caught in the garden.
13. 1 hog deer born in the garden.
14. 1 song sparrow caught in the garden.
- 1 European red fox (♀) presented by Mrs. Hand, Philadelphia.
- 8 chestnut-eared finches, 1 long-tailed grass finch, 1 amadavine finch, 1 spotted
munia finch, 1 Japanese nun, 7 domestic canaries, 2 red-beaked weavers,
1 Bishop weaver and 1 undulated grass parrakeet presented by Mrs.
Benjamin Throop, Scranton, Pa.
16. 2 painted terrapin purchased.
19. 1 common marmoset presented by S. M. Rosin, Philadelphia.
- 2 blue mocking birds, 2 Swainson's yellow-legged thrushes, 4 lark sparrows
2 gray clarins, 2 Mexican crested hagnests, 4 black-headed grosbeaks,
1 spot-billed toucanet, 2 paradise whydah birds and 1 black-handed
spider monkey purchased.
21. 2 red-tailed hawks purchased.
23. 1 common opossum presented by Ralph Johnson, Philadelphia.
- 1 DeKay's snake presented by William Quigley, Philadelphia.
27. 1 DeKay's snake presented by Joseph Dunlap, Philadelphia.
28. 1 Salle's amazon presented by John A. Wilson, Philadelphia.
29. 13 non-venomous snakes purchased.
30. 12 non-venomous snakes purchased.
- 1 alligator presented by Herbert Becker, Philadelphia.
- April 1. 2 harlequin snakes purchased.
- 2 barred owls presented by Clarence Harbison, Swedesboro, N. J.
3. 1 rhesus macaque born in the garden.
- 1 wave-lined lizard presented by R. Dale Benson, Philadelphia.
4. 1 Say's pine snake presented by Mlle. Fifi, Philadelphia.
- 4 nine-banded armadillos purchased.
6. 1 Livingstone's eland (♂) purchased.
7. 1 common garter snake presented.
- 1 common black snake presented by Henry G. Landis, Philadelphia.
- 1 alligator presented by Florence Miller, Philadelphia.
11. 1 eastern diamond rattlesnake presented by C. B. Moore, Philadelphia.
- 1 urial born in the garden.
12. 2 common box tortoises presented by Miss Joy Smith, Philadelphia.
16. 1 common garter snake and 1 DeKay's snake presented by Louis Cooperman
- 1 American green lizard presented by Master Russell Brown, Philadelphia.
18. 1 pied-billed grebe presented by Miss A. W. Clark, Philadelphia.
- 2 brown pelicans, 2 black and white lemurs, 1 slender-billed cockatoo, 2 gray
parrots, 2 upland geese, 3 Swainson's francolins and 2 shaft-tailed magpies
purchased.
19. 21 non-venomous snakes, 2 copperhead snakes and 26 miscellaneous lizards
purchased.
20. 2 yellow-fronted green tanagers, 2 hooded siskins, 2 black-headed tanagers
and 4 yellow-throated finches purchased.
21. 1 common garter snake presented by Henry G. Landis, Philadelphia.
22. 4 waltzing mice born in the garden.
- 12 non-venomous snakes and 1 water moccasin purchased.
24. 1 aoudad (♂) born in the garden.
- 2 alligators presented by Miss J. Turner, Jenkintown, Pa.
26. 1 alligator presented by Miss Josephine Higgins, Philadelphia.
28. 1 aoudad (♂), 1 green monkey (♀) and 3 silver pheasants born in the garden.
29. 74 non-venomous snakes, 7 ground rattlesnakes and 3 harlequin snakes pur-
chased.
- May 1. 4 waltzing mice born in the garden.
2. 261 miscellaneous lizards purchased.
3. 1 Levaillant's amazon presented by Alexander Colgan, Philadelphia.
- 1 alligator presented by Dr. John J. Maher, Philadelphia.
- 1 wave-lined lizard presented by Mr. Heid, Philadelphia.
4. 1 blue-fronted amazon presented by Mrs. W. A. Haug, Philadelphia.
5. 1 Himalayan Tahr (♂) born in the garden.
6. 1 cardinal presented by Mrs. W. C. Stripe, Upper Darby, Pa.
7. 1 alligator presented by Mrs. A. Clappier, Philadelphia.
- 3 red squirrels and 3 screech owls presented by Mrs. Edward S. Sayres, Haver-
ford, Pa.
8. 1 alligator presented by Mrs. Daniel Lang, Philadelphia.
9. 1 common macaque presented by Miss Ella Williams, Philadelphia.

- May 10. 1 green monkey born in the garden.
1 common hog-nosed snake and 1 common black snake presented by Clarence W. Fisher, Ambler, Pa.
2 cereopsis geese, 4 Japanese teal, 4 European robins, 2 black gorgeted jay thrushes and 4 common crossbills purchased.
11. 1 yak (♀) purchased.
13. 1 aoudad born in the garden.
1 green monkey (♂) presented by John J. Wilson, Philadelphia.
2 pin-tailed ducks and 1 Swinhoe's pheasant purchased.
14. 4 prairie dogs born in the garden.
1 American green lizard presented by Thos. McVeagh, Philadelphia.
1 American green lizard presented by J. K. Davison, Philadelphia.
15. 2 eastern wild turkeys born in the garden.
16. 1 aoudad born in the garden.
1 yellow-fronted amazon and 1 green-cheeked amazon presented by Walter Johnson, Philadelphia.
1 common hog-nosed snake and 20 miscellaneous lizards purchased.
17. 1 mandrill (♂), 1 fishing cat, 1 striped hyena (♀), 1 Indian paradoxure, 1 red-necked wallaby (♂), 3 snake-eating cobras, 3 Indian cobras, 2 yellow-vented bulbuls, 2 blue-winged green bulbuls, 2 sarus cranes, 2 European cranes, 2 Indian dial birds, 2 silver-eared liothrix, 1 red-tailed oriole, 1 occipital blue pie, 2 black-necked storks, 2 Indian shama, 2 white storks, 1 bay-backed shrike, 2 black-fronted blue tanagers, 2 golden-eyed babblers, 2 Javan titmice, 1 tawney-throated thrush and 2 Egyptian white vultures purchased.
19. 1 common peafowl presented.
20. 1 hog deer (♂) and 7 waltzing mice born in the garden.
1 Brazilian tree porcupine, 2 crested hangnests, 1 yellow-billed green toucan, 2 banded toucans, 1 pileated finch, 2 philander opossums, 2 pinche mar-mosets, 2 Peruvian squirrels and 1 noisy douroucouli purchased.
21. 1 Indian buffalo (♀) born in the garden.
5 non-venomous snakes purchased.
22. 1 red deer (♀) born in the garden.
1 common garter snake presented by Joseph Dunlap, Philadelphia.
23. 1 rhesus macaque born in the garden.
25. 1 rhesus macaque born in the garden.
1 Indian dial-bird purchased.
26. 1 Maryland yellow-throat caught in the garden.
27. 1 albino chipmunk presented by Albert DeWitt Altemus, Saylorsburg, Pa.
1 woodchuck presented by Earl Miller, Philadelphia.
1 woodchuck born in the garden.
1 red deer born in the garden.
29 non-venomous snakes purchased.
28. 1 Indian antelope born in the garden.
29. 1 bison (♀) born in the garden.
30. 1 crested ground parakeet (♀) presented by Mrs. A. P. Clarkson, Philadelphia.
31. 1 Japanese sika deer (♀) born in the garden.
1 American green lizard and 1 turtle presented by Charles T. Moore, Jr., Philadelphia.
- June 3. 1 Japanese sika deer (♂) born in the garden.
1 American green lizard presented by Roland Earl, St. Paul, Minn.
4. 1 common opossum (♀) presented by the Women's Pennsylvania Society for the Prevention of Cruelty to Animals, Philadelphia.
7. 1 woolly monkey (♂), 2 black-handed spider monkeys (♂ ♀), 1 Giant anteater (♀), 1 six-banded armadillo (♀), 1 coromandel plover, 2 red-wattled plover, 1 ringed plover, 2 blue-throated robins, 2 blue-headed wagtails, 2 European redstarts, 1 meadow pipit and 1 common iguana purchased.
8. 1 red monkey (♀) in exchange.
2 pumas (♂ ♀) born in the garden.
9. 1 vulpine phalanger born in the garden.
1 least bittern (♂) presented by Mrs. T. F. Maroney, Philadelphia.
1 purple gallinule presented by M. H. Pressley, Philadelphia.
10. 1 Japanese sika deer (♂) born in the garden.
12. 1 purple gallinule presented by Albert Rapp, Philadelphia.
1 Himalayan tahr (♂) born in the garden.
1 painted terrapin and 2 spotted terrapin presented by John Doty, Philadelphia
13. 20 non-venomous snakes, 1 horned rattlesnake, 1 Pacific rattlesnake and 20 miscellaneous lizards purchased.
14. 1 fallow deer born in the garden.
15. 1 pig-tailed macaque born in the garden.
16. 2 alligators presented by William M. E. Powers, Moorestown, N. J.
17. 3 American Herring gulls born in the garden.
18. 1 weeper cebus presented by Mrs. Ruby Hawn, Atlantic City, N. J.
19. 3 American green lizards presented by Joseph Dunlap, Philadelphia.
1 fallow deer (♂) born in the garden.
20. 1 alligator presented by E. F. Henning, Philadelphia.
1 common water snake and 1 common box tortoise presented by W. Ellis, Philadelphia.

- June 21. 1 fallow deer born in the garden.
1 Canada porcupine presented by J. C. Sutton, Philadelphia.
22. 1 alligator presented by V. R. Carrick, Philadelphia.
1 Himalayan tahr born in the garden.
1 American beaver purchased.
23. 1 yellow-shouldered amazon presented by H. Albertson, Philadelphia.
29. 1 chaffinch, 1 cutthroat finch, 1 mountain finch, 2 green finches, 1 yellow-bellied liothrix, 3 common siskins and 1 red-beaked weaver purchased.
1 woodchuck (♀) presented by Miss G. Carhart, Philadelphia.
1 American green lizard presented by Geo. M. Maclean, Philadelphia.
- July 1. 4 common skunks presented by Edward Mosher, Philadelphia.
1 common box tortoise presented by John Regan, Philadelphia.
4. 1 Zebu (♂) born in the garden.
6. 2 great horned owls presented by H. Leidtke, South Lakewood, N. J.
7. 1 alligator presented by Morgan Hebard, Philadelphia.
1 alligator presented by Temple G. King, Philadelphia.
1 weeper cebus presented by Mrs. H. W. Loeb, Oaklyn, N. J.
1 blue-fronted amazon presented by Mrs. C. G. Hartley, Philadelphia.
11. 2 alligators presented by N. J. Schneider, Philadelphia.
16. 1 spotted cavy born in the garden.
1 snapper terrapin presented by Miss Dorothy Houck, Philadelphia.
17. 1 red-eared terrapin presented by Mrs. H. H. Starr, Philadelphia.
21. 1 spiny-tailed iguana presented by Walter Palmer, Chester, Pa.
4 chukar partridges and 1 wonga wonga pigeon purchased.
22. 1 alligator presented by Master Frank Henkels, Philadelphia.
24. 2 harlequin snakes and 24 non-venomous snakes.
27. 1 musk turtle presented by William Wentzel, Philadelphia.
28. 1 common night heron presented by C. R. Baker, Philadelphia.
29. 1 common water snake presented by Dr. William Pepper, Philadelphia.
30. 2 barred owls presented by Russell Morgan, Minersville, Pa.
- Aug. 3. 1 common bulfinch (♀) presented by Mrs. Henry Nelson, Philadelphia.
5. 1 weeper cebus presented by William Barg, Philadelphia.
6. 2 golden eagles purchased.
10. 2 common garter snakes presented by Thomas Murgitroyde, Philadelphia.
11. 1 crocodile presented by Mr. Charles M. Lea, Philadelphia.
6 gopher tortoises, 2 yellow hagnests, 2 South American pygmy owls, 2 South American burrowing owls, 2 laughung gulls, 3 common troupials, 2 bare-eyed pigeons, 2 black-headed tanagers, 2 South American cardinals (♂ ♀) and 4 Sonnini's quail purchased.
13. 2 Audubon's caracaras purchased.
14. 1 ring-necked snake presented by Mr. J. W. Kennedy, Philadelphia.
1 parakeet presented by Mrs. H. P. Laverty, Philadelphia.
- 25 non-venomous snakes, 3 Pacific rattlesnakes and 27 miscellaneous lizards purchased.
16. 1 fallow deer (♂) born in the garden.
2 common hog-nosed snakes and 3 common garter snakes presented by C. E. Nash, Wyncote, Pa.
1 osprey presented by George G. Wehr, Philadelphia.
17. 1 common garter snake presented by William Beisel, Philadelphia.
1 least bittern presented by Charles A. Butsch, Philadelphia.
1 prairie dog presented by Mrs. Henry Norris, Rutherfordton, N. C.
21. 19 common garter snakes born in the garden.
23. 1 white-fronted amazon presented by Mrs. H. Menge, Philadelphia.
24. 1 song sparrow caught in the garden.
25. 1 lesser white-nosed monkey presented by W. L. Tindall, Lansdowne, Pa.
26. 2 Texas skunks and 10 collared lizards purchased.
28. 1 alligator presented by John W. McKeenan, Philadelphia
31. 2 golden pheasants (♂ ♀), 2 Amherst's pheasants (♂ ♀), 2 black-crested pheasants (♂ ♀), 2 Manchurian eared pheasants (♂ ♀), 2 Reeves' pheasants and 1 Swinhoe's pheasant (♂) purchased.
- Sept. 2. 1 alligator presented by G. L. Hooven, Philadelphia.
3. 1 American egret presented by Mrs. Edward Martin, Media, Pa.
5. 2 alligators presented by Albert Schimpf, Philadelphia.
9. 3 Canada geese, (♂ ♂ ♀), presented by Mrs. William Winsor, Ardmore, Pa
10. 1 striated terrapin presented by John L. Ackroyd, Norwood, Pa.
1 blue-fronted amazon presented by Mrs. Alma F. Johnson, Philadelphia.
1 Levaillant's amazon presented by J. Frank Harvey, Coatesville, Pa.
1 mandrill (♀), 4 wood ducks (♂ ♂ ♀ ♀), 8 pintailed ducks (♂ ♂ ♂ ♂ ♀ ♀ ♀ ♀), 2 blue-winged teal (♂ ♀), 2 Chinese geese (♂ ♀), 4 Canada geese (♂ ♂ ♂ ♀) and 4 demoiselle crane by purchase.
13. 2 white-nosed coatis (♂ ♀), 1 ruff, 2 banded rattlesnakes and 1 smooth green snake by purchase.
2 waltzing mice (♂ ♀) presented by William Quigley, Philadelphia.
1 common box tortoise presented by Dr. A. R. Rénninger, Philadelphia.
14. 2 ring-necked pheasants (♂ ♀) by purchase.
15. 1 alligator presented by Ralph P. Miller, Philadelphia.
5 muscovy ducks hatched in the garden.

- Sept. 16. 1 common raccoon (σ) presented by Mrs. Clara Warner, Clayton, Del.
 1 yellow-fronted amazon presented by Mrs. William Elkington, Philadelphia.
19. 2 alligators presented by Henry Oeljeklaus, Philadelphia
21. 1 screech owl presented by Fred Schmidheiser, Philadelphia.
23. 1 alligator presented by H. R. Hearn, Philadelphia.
 2 Florida black ducks (σ ♀) and 1 little white heron by purchase.
25. 2 Barbary turtle doves (σ ♀) presented by Harrison Wirth, Philadelphia.
 1 ring-necked parrakeet (σ) presented by Mrs. K. Rushton, Wynnewood, Pa.
26. 1 pine snake presented by Leslie Henderson, Philadelphia.
28. 1 wall lizard presented by Armstrong Cork Co., Philadelphia.
30. 1 alligator presented by A. J. Malin, Pheenixville, Pa.
 1 brown cebus (σ) presented by Miss M. Van Sciver, Philadelphia.
 1 common box tortoise presented by A. E. Curtis, Philadelphia.
- Oct. 1. 1 screech owl presented by Charles Goebel, Philadelphia.
 1 carrier pigeon presented by Mrs. Edith E. Holmes, Philadelphia.
2. 1 alligator presented by James F. Ramsden, Philadelphia.
 1 alligator presented.
 1 alligator and 1 Geoffroy's marmoset presented by Andrew S. Grey, Philadelphia.
- 2 common box tortoises, 2 painted terrapin, 2 spotted terrapin, 2 mud turtles and 1 snapper terrapin presented by Douglas D. H. Marsh, Philadelphia.
7. 2 common black bears (σ 's) presented by Richard Beaton, Tyrone, Pa.
 1 drill, 1 black-handed spider monkey, 2 white-eared bulbuls, 1 blue-crowned coure, 1 red-shouldered coure, 1 red-winged francolin, 3 pileated francolins, 2 ultramarine weavers, 2 white-cheeked larks, 2 Chinese mynahs, 1 great green macaw, 1 blossom-headed parrakeet, 2 brush bronze-winged pigeons, 1 noisy-chat-thrush, 2 Jardine's babblers, 1 yellow-vented bulbul, 1 Swainson's bush shrike, 1 paradise whydah bird, 1 Bishop weaver and 1 Egyptian white vulture purchased.
8. 2 South African ostriches (σ ♀) and 1 Reeves' pheasant (σ) by purchase.
 1 yellow-fronted amazon presented by Mrs. F. Federschmidt, Overbrook, Pa.
10. 1 Mexican horned lizard presented by Della Maskell, Philadelphia.
11. 1 common mud turtle presented.
12. 2 DeKay's snakes presented by William Beisel, Philadelphia.
 1 painted terrapin presented by Miss Rebecca M. Drake, Philadelphia.
 1 common garter snake by purchase.
 2 Impeyan pheasants (σ ♀) and 4 white pheasants (σ 's) purchased.
 1 blue jay caught in the garden.
13. 2 Japanese pheasants (σ ♀) purchased.
14. 1 waltzing mouse born in the garden.
16. 1 pine snake presented by Edward North, Sewell, N. J.
 2 blue-winged teal purchased.
 3 alligators presented by Alvin Alexander, Philadelphia.
17. 2 golden eagles (σ ♀) purchased.
18. 1 gray parrot and 1 Salvin's amazon presented by A. G. Husson, Philadelphia.
19. 2 western diamond rattlesnakes purchased.
 1 white-throated sparrow caught in the garden.
20. 1 black leopard purchased.
22. 1 saw-whet owl presented by S. Lewin, Philadelphia.
23. 1 Malayan tapir, 1 orang-utan, 2 sun bears and 1 silver gibbon purchased.
25. 1 common garter snake presented by William Beisel, Philadelphia.
26. 4 canvas-backed ducks purchased.
27. 1 pine snake presented by M. Warner Hargrove, Brown's Mills, N. J.
28. 1 screech owl presented by Miss Bryant, Philadelphia.
29. 4 green-winged teal (σ ♂ ♀ ♀) purchased.
- Nov. 1. 2 alligators presented by Miss Virginia Chase, Philadelphia.
 1 American bison (σ) born in the garden.
3. 1 American green lizard presented by Mrs. L. Law, Philadelphia.
 1 red-tailed hawk presented by A. J. Cassatt Estate, Haverford, Pa.
- 20 Australian snakes and 7 Australian lizards purchased.
4. 1 common raccoon presented by P. D. Reynolds, New York City.
 2 Tamandua anteaters and 3 entellus monkeys purchased.
8. 1 marabou stork, 1 secretary vulture, 2 golden-headed coures, 4 ariel toucans, 1 Baillon's toucanet and 1 spot-billed toucanet purchased.
9. 6 alligators presented by L. C. Lehman, Green Creek, N. J.
 1 American bittern presented by E. M. Cunshaw, Philadelphia.
10. 1 green monkey (σ) presented by Mrs. H. M. Partridge, Philadelphia.
 2 screech owls presented by Samson Goodkin, Philadelphia.
11. 1 wood thrush presented by Mrs. John H. Buxton, Philadelphia.
 1 American green lizard presented by Orwyn Ellis, Philadelphia.
12. 1 axis deer (♀) born in the garden.
 1 black snake presented by Thomas Bonner, Swarthmore, Pa.
14. 1 short-eared owl presented by David Lamond, Philadelphia.
15. 1 red-shouldered hawk presented by Thomas Durnan, Upper Black Eddy, Pa.
16. 1 red-tailed hawk presented by Alfred Clements, Devon, Pa.
17. 2 alligators presented by Wm. C. Knitter, Philadelphia.
19. 1 hog deer (♀) born in the garden.

- Nov. 20. 1 American barn owl presented by S. H. Swan, Philadelphia.
1 song sparrow caught in the garden.
21. 1 alligator presented by Estelle Emerline, Philadelphia.
23. 2 painted terrapin and 1 snapper terrapin presented by Wm. Beisel, Philadelphia.
25. 1 DeKay's snake presented by Jos. J. Coursault, Philadelphia.
26. 1 alligator and 1 turtle presented by Master Richard Earle, Philadelphia.
1 screech owl presented by Jos. J. Friel, Philadelphia.
- Dec. 3. 1 American bison (♀) born in the garden.
3. 1 alligator presented by Miss M. C. Quigley, Philadelphia.
13. 1 alligator presented by Robert M. Search, Philadelphia. 4
16. 1 red-tailed hawk presented by Dr. D. Baglivo, Philadelphia.
21. 1 common garter snake, 3 painted terrapin and 1 Muhlenburg's terrapin purchased.
22. 36 salamanders presented by William Beisel, Philadelphia.
29. 1 waltzing mouse born in the garden.
31. 1 alligator presented by Charles Woolfe, Philadelphia.
1 Florida gallinule presented by Aaron Cartes, Philadelphia.
- 1922.
- Jan. 9. 1 common crow presented by D. Hayes, Philadelphia.
11. 5 waltzing mice born in the garden.
12. 1 black bear (♂) presented by Frederick Schupphaus, Barren Hill, Pa.
13. 1 turkey vulture presented.
17. 1 common opossum presented by H. C. Kauffman, Jr., Philadelphia.
20. 1 screech owl presented by Angelo Montana, Philadelphia.
1 short-eared owl presented by David McCadden, Philadelphia.
25. 1 emu purchased.
26. 1 American wild cat purchased.
1 bald eagle presented by Fred Neeberle, Philadelphia.
1 rhesus macaque (♂) presented by Daniel J. Kelley, Philadelphia.
31. 1 amadavine finch presented by Charles H. Brown, Philadelphia.
- Feb. 3. 1 alligator presented by Frank Savage, Atlantic City, N. J.
1 screech owl presented by Capt. C. P. Nelson, Philadelphia.
4. 1 hippopotamus (♂) born in the garden.
1 llama (♂) born in the garden.
12. 1 weeper cebus presented by Parvis C. Daniels, Philadelphia.
25. 1 white-necked raven presented by Wharton Huber, Philadelphia.
1 screech owl presented by William O'Brien, Philadelphia.
1 common raccoon (♂) presented by Frank B. LaPlace, Sicklerville, N. J.

The report of the laboratory of comparative pathology is appended. By order of the Board of Directors,

WILLIAMS B. CADWALADER,
Secretary.

REPORT OF THE LABORATORY OF COMPARATIVE
PATHOLOGY FOR THE YEAR ENDING
FEBRUARY 28, 1922.

The laboratory can report for the past twelvemonth a very interesting and perhaps practically valuable experience. During the course of routine examinations a number of instructive cases have been encountered while some of the experimental and investigative work that has been under way has reached a point of readiness for publication as well as for direct clinical trial. Most of this latter is technical in nature, for which reason a full discussion will be reserved for Part II of this report, although certain general phases of it may be touched upon in this section.

Following the usual custom I wish to report first upon the general mortality of mammals and birds. There were 2134 specimens of these classes in the collection during the year, of which 520 died, a percentage of 24.4, or slightly in excess of that for last year. Analysis of our records does not offer any ready explanation for this increase except for the deaths in a few orders, the figures

FOR THE YEAR ENDING	MAMMALIA AND AVES			MAMMALIA			AVES		
	Animals exhibited	Deaths	Per cent. mor- tality	Animals exhibited	Deaths	Per cent. mor- tality	Animals exhibited	Deaths	Per cent. mor- tality
February 28, 1907....	1343	346	25.7	521	109	20.9	822	237	28.8
February 28, 1908....	1439	275	19.1	487	84	17.2	952	191	20.0
February 28, 1909....	1439	267	18.5	487	98	20.1	952	169	15.6
February 28, 1910....	1412	250	17.7	479	90	19.2	933	160	17.1
February 28, 1911....	1467	318	21.6	500	93	18.6	967	225	23.2
February 28, 1912....	1513	360	23.7	516	105	20.3	997	255	25.5
February 28, 1913....	1511	309	20.5	552	124	22.4	959	185	19.2
February 28, 1914....	1543	290	18.9	554	98	17.6	989	192	19.5
February 28, 1915....	1614	347	21.5	562	104	18.4	1052	243	23.
February 28, 1916....	1630	381	23.3	601	108	17.9	1029	273	26.5
February 28, 1917....	1888	337	18.1	596	90	16.7	1292	247	19.1
February 28, 1918....	2019	451	22.3	629	92	14.6	1390	359	25.8
February 28, 1919....	2020	370	18.3	648	114	17.5	1372	256	18.6
February 28, 1920....	2033	447	21.9	628	147	23.3	1405	300	21.3
February 28, 1921....	2390	574	24.	671	126	18.7	1719	448	26.
February 28, 1922....	2133	520	24.4	611	121	19.8	1522	399	26.2

Since only a few of the reptiles and amphibians are autopsied they have been subtracted from the death list and the percentage computed on basis of mammals and birds only.

for which go to swell the total and may explain the slight rise. Amongst the Primates there was an increase of six deaths. Four of these were executions because of poor condition and suspicious tuberculin reactions. Five were cases of degenerative bone disease in monkeys that have been born here or held in captivity for a long time. The parrots had a mortality greater than their average because of an outbreak of parrot-typhoid last summer, whilst the Columbæ supplied eleven cases of tuberculosis with a total increase of five deaths over last year in this order. These figures increase the percentage because of high mortality rates for their respective order and offset the reduced percentages amongst the Ungulata, Passeres, Picariæ, and Striges. The first of these orders has a reduced mortality partly because more care has been exercised in separating pugnacious cage-mates and greater attention has been given to soft food, the latter having caused several important deaths in recent years. Not so many passerine birds are listed amongst the dead probably because fewer new ones have been received during the year. Examination of the figures for mammals shows a definite increase of death rate. There has been little change in the avian percentage mortality.

New acquisitions have numbered 519, 159 mammals and 360 birds. Ninety-three of these died within eight weeks of their arrival, 17.8%. It so happens that we had 520 autopsies, ninety-three or 17.8% being these animals dying shortly after arrival. If we credit the general mortality with this number—deaths in specimens not yet accustomed to their surroundings,—the death rate will be found to be 20%. These findings are similar to those of last year wherein it was found that about a fifth of the total mortality is amongst newly arrived specimens. This year however 17.8% of new animals died whereas last year only 11% died; the reason for this is not apparent from the laboratory records but can possibly be supplied by the Superintendent; perhaps the quality of available material has been poor.

There occurred as usual a number of deaths of valuable animals about which a few words will be interesting. The Southern Giraffe died after an illness of about a week manifested by refusal to eat and actions suggesting intestinal discomfort. He was found to have a destructive form of pancreatitis, acute gastritis, early cirrhosis of the liver and inflammation of the gall bladder. Many hook-worms were found in the bile channels, a form of parasitism which could not have been reached medically and which very probably were responsible for the hepatic and pancreatic disease. It is interesting to note that the Giraffe which died in 1917 had very similar findings, the worms being the same and in the same location. A Burchell's Zebra, in the collection six years, had always exhibited a tendency to heaves. At autopsy a definite chronic gastro-enteritis of long standing had had engrafted upon it an acute indigestion which gave rise to acute tympanites especially of the stomach. The contents of the organ did not seem incorrect in any way. A Silver Gibbon was in poor condition at arrival so that he was confined to the quarantine room. His death was due to hemorrhagic septicemia contracted before delivery at the Garden. Another death shortly after arrival was that of an Entellus Monkey. There existed a severe inflammation of the respiratory tract, with a beginning extension of the disease from the nose to the cerebral meninges. Bacterial cultures from this animal revealed the pneumococcus and the pneumobacillus (of Friedlander). This case is the more interesting in view of the fact that a few weeks later the Snow Leopard, the beautiful specimen at the north end of the Carnivora House, died with the same bacterial infection and very similar pathology. These cases are significant since during this winter there have been many cases of so-called influenza amongst human beings and the physical findings in these animals is not far from what can occur in humans with this disease. Etiologically considered the organisms found in these two specimens can cause in man changes comparable to influenza. The

Pfeiffer bacillus of influenza was not found. These two cases are perhaps sporadic and possibly due to infection from man. Two Tamandua Anteaters lived a very short time after arrival, an only too common experience with these interesting animals. They both suffered with gastric disease. The American Oyster-catcher, an interesting bird, died from disease of the heart valves in all probability due to infection from the skin of the legs which were effected with a purulent dermatitis. This illustrates how cutaneous disease may be the starting point of a general infection, a point recently appreciated fully in human medicine. An outbreak of fowl typhoid was detected in the parrot house in May of 1921. As soon as its existence was realized the entire stock was removed to individual cages on the walk outside and the exhibition cages disinfected by flame and paint, measures which seemed to settle the matter. This occurrence is discussed more at length on a later page.

I have continued work upon the curious disease to which Kangaroos are so susceptible, having unfortunately five more cases to work on during the past year. The results of our investigations seem to inculcate for the disease a new species of *Nocardia* but unfortunately for its final conviction I have not yet been able to reproduce the lesions in other animals, including our native marsupial, the opossum, by injecting the cultures of the germs. One large Robust Kangaroo was treated by the injection of vaccine made from cultures of a recent case. The result of this method of treatment was encouraging, for, while the animal finally died, he lived for over two months whereas the average length of time for the disease to be fatal is less than two weeks from its first certainly recognizable signs. In addition to treating this case we have injected the vaccine of killed cultures, as a prophylactic measure, into two Kangaroos exposed to the above animal and into another which seemed to have a very early lesion. To date, now four months, none of these have developed anything but this is not conclusive of their immunization since they may not have been

affected, the disease not being highly communicable. The practice of examining all the Kangaroos thrice yearly is in vogue.

Dr. Corson-White's very interesting studies upon the degenerative bone disease of monkeys would indicate that the cases studied are really affections of the osseous system, not primary in the nervous system, although they are possibly related to changes in the ductless glands; they seem dependent upon unbalanced diet. The absence of sufficient calcium, which acts as a fixative for phosphorus, and of some vitamins seems potent in the production of the disease. This however will not account for the limitation of the disease incidence to New World monkeys, the Cebidæ, and we must assume that they are particularly susceptible to unbalanced diet. Recommendations for changes have been made, the principal one being the feeding of lime water, for its calcium content. Some years ago I tried the administration of adrenalin and calcium lactate with no benefit. Since the lime water has been used, three cases of another sort have appeared—hypertrophic osteitis or osteitis deformans—an atypical overgrowth which as the name indicates produces soft bones of deformed type. This would imply that in monkeys susceptible to unbalanced diet, the disease is probably not to be cured if already started, (these animals had been noticed as slightly "rickety" before the limewater was given) and that while calcium may help to build up bone, the result will not be functionally correct if the original cause, whatever it be, remain operative. Dr. Corson-White suggests that the diet be enriched as far as possible by salt, milk or its butter fat, and leafy vegetables.

The Pathological Society of Philadelphia held its meeting at the laboratory on May 12 last, at which time Dr. Corson-White presented the data then available about the bone disease just described and showed two interesting specimens. Dr. Weidman discussed the importance of parasites as causes of death, illustrating by

a few examples. I showed a case of mayhem in an ocelot possibly due to heavy infestation with lice, multiple tumors in a jaguar and discussed the development of pneumonia in birds and mammals. In the latter, the exact method of the production of pneumonia cannot be said to have been seen whereas the simpler construction of the avian lung permits one to trace the disease process from the bronchial tubes into the respiratory spaces proper, or if the disease virus come via the blood, from deep in the lung to the bronchi. This will be published later.

Dr. Corson-White has ready for publication two papers, one upon the incidence and cause of osteomalacia and rickets in the lower animals, the other upon osteitis deformans in monkeys. I read before the College of Physicians of Philadelphia on December 7, a paper upon the Comparative Pathology of the Heart. The work, which will be published, goes to show that the large heart of the bird does not become diseased or enlarged as readily as the relatively smaller heart of the mammal.

The following is a list of the animals dying during the year. The total will be found not to tally with the records upon the table as some specimens have died from injury and some were decomposed. Moreover, in many instances animals are included in the figures of more than one heading since lesions of importance may have been found in more than one of the systems. It is seldom the case that only one of the systems is sufficiently affected to be the only cause of death.

Total animals examined, 520.

Total MAMMALIA, 121.

Primates, 25; Lemures, 1; Carnivora, 19; Rodentia, 14; Ungulata, 33; Hyracoidea, 5; Edentata, 6; Marsupialia, 18.

Total AVES, 399.

Passeres, 192; Picariæ, 5; Psittaci, 53; Striges, 17; Accipitres, 18; Columbæ, 21; Galli, 38; Fulicariæ, 3; Alectorides, 6; Limicolæ, 8; Gaviæ, 3; Herodiones, 6; Anseres, 25; Struthiones, 4.

DISEASES OF THE DIGESTIVE SYSTEM:

Proventriculitis: Psittaci, 1; Anseres, 1.

Ulcers in proventricle: Passeres, 1; Psittaci, 1; Galli, 1; Limicolæ, 1.

Gastritis: Ungulata, 5; Carnivora, 4; Primates, 2; Marsupialia, 2; Edentata, 1; Struthiones, 1.

Ulcers in stomach: Marsupialia, 3; Primates, 1; Passeres, 1; Columbæ, 1.

Enteritis: Carnivora, 8; Primates, 6; Ungulata, 4; Marsupialia, 3; Rodentia, 2;

Edentata, 2; Psittaci, 28; Passeres, 25; Galli, 16; Accipitres, 9; Anseres, 6;

Struthiones, 3; Striges, 2; Columbæ, 2; Limicolæ, 2; Picariæ, 1; Gaviæ, 1;

Herodiones, 1.

Prolapse of Rectum: Edentata, 1.

Tympanitis: Ungulata, 1; Psittaci, 1.

Liver:

Acute (degenerations, inflammations, etc.): Carnivora, 5; Primates, 2; Rodentia, 2; Marsupialia, 2; Psittaci, 10; Passeres, 9; Galli, 7; Striges, 1; Picariæ, 1; Accipitres, 1; Struthiones, 1.

Chronic (Cirrhoses, etc.): Ungulata, 2; Striges, 1; Accipitres, 1.

Cholelithiasis: Passeres, 2; Accipitres, 1.

Cholecystitis: Carnivora, 1; Ungulata, 1; Accipitres, 1.

Parasites in bile ducts: Carnivora, 1; Ungulata, 1.

Amyloid: Anseres, 2.

Pancreatitis: Carnivora, 2; Ungulata, 1; Marsupialia, 1; Striges, 2; Accipitres, 1; Anseres, 1; Struthiones, 1.

DISEASES OF THE CIRCULATORY SYSTEM:

Endocarditis: Marsupialia, 1; Struthiones, 2; Herodiones, 1; Limicolæ, 1.

Pericarditis: Ungulata, 1; Psittaci, 1; Galli, 1; Alectorides, 1.

Myocarditis: Carnivora, 1; Rodentia, 1; Accipitres, 2; Passeres, 1; Anseres, 1; Limicolæ, 1.

Aneurysm of heart: Psittaci, 1.

Congenital hypertrophy of heart: Primates, 1.

Parasites in myocardium: Ungulata, 1.

Patulous foramen ovale: Ungulata, 1.

Arteritis: Primates, 1.

Arteriosclerosis: Marsupialia, 2; Ungulata, 1; Accipitres, 2; Psittaci, 1; Herodiones, 1; Struthiones, 1.

Atheroma: Carnivora, 2; Primates, 1; Psittaci, 3; Anseres, 2; Passeres, 1; Accipitres, 1; Struthiones, 1.

Thrombus: Carnivora, 1; Marsupialia, 1; Alectorides, 1.

DISEASES OF THE GENITO-URINARY SYSTEM:

Nephritis:

Acute: Primates, 4; Carnivora, 3; Ungulata, 2; Rodentia, 2; Marsupialia, 1; Psittaci, 7; Accipitres, 3; Struthiones, 3; Passeres, 2; Anseres, 2; Picariæ, 1; Striges, 1; Columbæ, 1.

Chronic: Carnivora, 3; Marsupialia, 3; Ungulata, 1; Rodentia, 1; Passeres, 2; Anseres, 2; Psittaci, 1; Accipitres, 1.

Renal Calculi: Carnivora, 1.

Uremia: Marsupialia, 1.

Cystitis: Carnivora, 1.

Tuboovarian Abscess: Primates, 1.

Cystic ovary: Carnivora, 2.

Hydrometra: Carnivora, 1.

DISEASES OF THE RESPIRATORY SYSTEM:

Pneumonia:

Broncho: Ungulata, 2; Marsupialia, 6; Edentata, 1; Primates, 1; Rodentia, 1; Psittaci, 4; Passeres, 3; Galli, 2; Picariæ, 1; Anseres, 1.

Chronic interstitial: Carnivora, 1.

Vermineous: Rodentia, 1; Marsupialia, 1; Edentata, 1.

Influenza: Primates, 1; Carnivora, 1.

Congestion of lung: Marsupialia, 4; Hyracoidea, 3; Ungulata, 1; Rodentia, 1; Passeres, 36; Psittaci, 11; Galli, 4; Struthiones, 2; Striges, 1; Accipitres, 1; Columbæ, 1; Anseres, 1.

Abscess of lung: Carnivora, 2.

Necrotizing naso pharyngitis: Primates, 1.

Ethmoiditis: Ungulata, 1; Marsupialia, 1.

Pleuritis:

Chronic: Carnivora, 1.

Acute: Rodentia, 1; Passeres, 1; Galli, 1.

DISEASES OF THE LYMPHATIC SYSTEM:

Splenitis: Primates, 6; Carnivora, 4; Marsupialia, 4; Rodentia, 2; Ungulata, 1;
 Psittaci, 20; Passeres, 16; Accipitres, 5; Galli, 5; Anseres, 3; Struthiones, 3;
 Limicolæ, 2; Picariæ, 1; Columbæ, 1; Alectorides, 1; Herodiones, 1.
 Lymphadenitis: Primates, 1; Ungulata, 1; Marsupialia, 1.
 Amyloid: Anseres, 2; Alectorides, 1.

DISEASES OF THE SKELETON:

Osteomalacia: Primates, 3; Rodentia, 2; Galli, 4; Columbæ, 2; Anseres, 1.
 Rickets: Primates, 1.
 Osteitis deformans: Primates, 3.
 Scoliosis: Ungulata, 1.

DISEASES OF THE SEROUS MEMBRANES:

Peritonitis: Rodentia, 1; Galli, 3; Limicolæ, 1; Struthiones, 1.
 Serositis: Psittaci, 2; Galli, 2; Columbæ, 1; Anseres, 1.

INFECTIONS:

Mould: Anseres, 3; Psittaci, 2; Accipitres, 2; Passeres, 1; Galli, 1.
 Tuberculosis: Columbæ, 11; Anseres, 4; Alectorides, 3; Galli, 2; Herodiones, 1;
 Striges, 1; Struthiones, 1; Fulicariæ, 1; Primates, 1; Carnivora, 1.
 Psittacosis: Psittaci, 11.
 Actinomycosis: Ungulata, 1.
 Kangaroo disease: Marsupialia, 5.

MISCELLANEOUS:

Tumors: Carnivora, 3; Primates, 1; Rodentia, 1; Ungulata, 1; Psittaci, 1; Striges, 1.
 Anemia: Primates, 5; Ungulata, 2; Passeres, 6; Galli, 1.
 Thyroid disease: Carnivora, 3; Primates, 1; Passeres, 1; Galli, 1.

PART II.

TUBERCULOSIS.

The tuberculin test has been applied to twenty-two new arrivals and twenty times, as retests, to fifteen other animals. Four of the first group, giving questionable temperatures and being in poor condition, were sacrificed; tuberculosis was not found. The presence of tuberculosis in new arrivals is decidedly less than it was in former years but no relaxation in our quarantine and testing methods has been permitted. We have, however, to report a death from this disease in the exhibition cages, the second in five years and nine months. This monkey, Grivet No. 20, was received in 1916, passed the first test and the retest of 1918. At the third test in 1920, his temperature was not quite satisfactory and he was placed in a separate outside cage. He was brought indoors because of the cold and, because it was desired to include him with others in one cage, another test was given; this he passed with a fairly good, or at least not suspicious, chart. He remained on exhibition six months when he died from caseous tuberculosis of the lung with an acute general miliary form. This could have been contracted and have developed within the six months since the tuberculin test. The three monkeys in the same cage were tested at once, held in the quarantine room and retested after four months. Six months have elapsed since the death of the tuberculous animal and two since the last test; these animals seem in good condition. One more death occurred in mammals from this disease, a female Kamchatkan Bear in the collection eight years. The disease was of long standing and was partly fibrotic although cavity formation existed in the lung.

The incidence of tuberculosis amongst the birds takes again a decline, there being 24 against 29 for 1921 and

35 for 1920. They occurred as follows: Columbæ 11, Anseres 4; Alectorides, 3; Galli, 2; Herodiones, 1; Striges, 1; Struthiones, 1; Fulicariæ, 1. The distribution in the garden is significant in only one respect. It would seem that we had a group of infected cranes in the enclosure near the North gate. Since turning over the soil with lime the deaths have stopped, the infected animals having been removed by death. In the large bird house the incidence in the cages is very satisfactory. Thirteen cages, infected in 1920 and 1921 have failed to show any tuberculous cases. Three only were infected this year and last year. Three new cages were found represented this year. These figures show a steady improvement of the hygiene of the bird house so far as tuberculosis is concerned.

Mould disease is decidedly better this year but as the fungi are ever with us it may recur; at all events we are thankful for any low figures.

* * * * *

FOWL TYPHOID IN THE PARROTS.

This infectious condition cost the life of twenty-one birds during May and June. The origin of it is not clear although it was possibly introduced by a new comer, additions to this collection being frequent. The outbreak is worthy of brief recital for two reasons—the measures used to eradicate it and the nature of the pathology. During the eight days following May the fourth six birds came to autopsy with severe toxic and hemorrhagic enteritis, suggesting fowl cholera; one of these birds had also pneumonia. From the thirteenth of the month until June 9th, when the infection ceased, fifteen more birds died but the manifestations were not exactly the same, they being divisible into two groups. One and the more numerous, amounting to ten, showed the intestinal lesions to be a little less serious but with the liver deeply, the lungs moderately involved. From several of these birds' heart-blood *B. psittacosis* was isolated. The remaining five birds had moderate in-

testinal and hepatic lesions but severe pulmonary and air sac disease. From three of these *B. pyocyaneus* was isolated and from one the *B. psittacosis* as well. It seems as if there were a sudden outbreak of the disease which carried off six birds in a hurry, whereupon the virulence of the agent settled a little to moderate severity, and that in five animals a mixed infection with *B. pyocyaneus*, chiefly in the air sacs, took place.

Shortly after we were aware that a communicable disease had struck the parrot house, all birds were removed, the sound ones to separate cages along the walk, the droopy ones to the Laboratory, and the exhibition cages cleaned by flame and paint. The sick birds were treated, half by aspirin, half by aromatic sulphuric acid, in the drinking water. We cannot say that this treatment had any effect since two of the eight died.

I wish to call attention to the anatomy of the lesions in the organs of the birds dying from full-fledged psittacosis since they are different from other avian lesions. It is noteworthy that the cases in which these "tubercles" were best displayed gave the cultures of the bacillus. Example of histological notes:—

Microscopical section of lung shows the organ nearly obliterated by pneumonia and congestion. Some ends of bronchi seen, few having extensive exudative inflammation. Secondary alveoli for the most part open whilst the primaries are occupied by round, polynuclear and RBC in which mass epithelia are difficult to detect. Some secondaries show edema, others swollen epithelia, still others mixture of these with round cells. All vessels full and around them is a mantle of large solidly staining mononuclears. Here and there one can find a round group of large mononuclears with deeply staining nuclei, possibly vascular endothelia, with pigment and other granules. These "tubercles" are apparently significant because they can be found in intestinal mucosa, spleen, and elsewhere. Liver capsule is negative aside from many cells beneath it. Liver columns distinct because of separation, cells slightly granular, do not stain well and contain fine dark pigment granules. Capillaries show many small round and a few red blood cells. Kupffer cells not prominent. Blood vessels well filled but not grossly distended. Noteworthy change is found near vessels in definite cellular groups. These collections unlike those in the lung and elsewhere, are made up of several kinds of deeply stained cells, mostly round mononuclears but also some granular eosinophiles and polys; a few endothelioid cells are included. The groups are not definitely outlined but do not radiate or spread far. Spleen is made up of a diffuse small mononuclear tissue irregularly dotted with trabeculæ, moderately large vessels, small hemorrhages and cell groups like those seen in the lung. The last are, however, in this organ in all

probability occluded small vessels with an increase in endothelia and a small mononuclear mantle. The centers seem to have a tendency to necrosis. Kidney shows marked congestion and a few hemorrhages. The latter are more marked in the pelvis. The epithelia are swollen, vacuolated and granular. Glomeruli negative. Intestine muscular coat all right. Submucosa and deep mucosa rather rich in round cells but not markedly so. Mucosa slightly swollen and epithelia granular, and villous stalks definitely hyperemic. One "tubercle" seen in a villus stalk. The amount of pigment in the tissues is striking and indicates considerable blood destruction in this disease. The "tubercles" in the lung, spleen and intestine seem quite important as do the cellular groups in the liver, the latter being the cause of the mottling often seen and probably the forerunners of the necroses sometimes found.

* * * * *

There was a small outbreak of entero-hepatitis amongst the Texas Bobwhite early in the year. It did not affect other nearby specimens and seemed to disappear upon removal from the exhibition cage to quarantine space. We cannot supply any data which will help with the explanation of the disease. *B. scoticus* of Grouse Disease was not found at one attempt. Two birds had heterakis in the ceca, two had not. In one fairly well studied, no coccidia could be found.

* * * * *

We lost two tapirs during the year, one from septi-cemia following prolapse of the rectum, one from actinomyces. The former failed to present adequate explanation for the intestinal protrusion but it would seem that the disturbance of the mucous membrane afforded a starting point for the sepsis from which the animal died. We have had several instances of abscess on the jaw of tapirs but this is the first one in which we could find the sulphur grains of actinomyces or demonstrate the organism in them and in the tissues after death. The course of the disease and the resulting destruction of tissue offer nothing peculiar in this animal, the whole process being comparable to that in horses and cows. We administered potassium iodide to the dose of two drams a day without effect. We thought at first that results were being obtained by the injection of a vaccine of actinomyces organisms but the animal became so unruly that we were forced to stop.

* * * * *

TUMORS.

Eskimo Dog ♂ (*Canis familiaris*). This dog presented on the back over the hind quarters a large "Basal-celled carcinoma" arising from the sebaceous glands or hair follicles. This was removed by operation. The tumor was well circumscribed and separated from the underlying tissues by an apparently thickened fascia. The dog was much emaciated. Recovery was prompt and animal gained in weight. He died six months after the operation. Postmortem examination showed no evidence of tumor at the sight of operation (macroscopically or microscopically) but there were metastases in the lung. These tumors are comparatively rare in man but quite frequent in lower animals. Krompecher, 1900, first adequately described this group of epidermal tumors which maintain the character of the basal cells. He traced their origin to the basal cells of the Malpighian layer of the skin. Those arising from the follicles usually have an adenoid form. The point of most interest in this case is the lung metastases as this tumor only occasionally metastasizes.

Barred Owl (*Strix varia*) ♀. Papillary adenoma of pancreatic ducts.

Malaccan Porcupine (*Hystrix longicauda*) ♀. Scirrhous carcinoma of mammary gland with metastases to lung, liver, spleen and kidney

Gray Wolf (*Canis vulpes*) ♀. Carcinoma of thyroid.

The right thyroid measures 7 x 2 x 2 cm., the left 7.5 x 2.5 x 2 cm. These measurements indicate considerable enlargement in sausage-like shape. Dull purple, indefinitely lobulated, prominent superficial veins. Soft resilient. Section surface is lobular, purple, bloody, not cystic but with large veins. In the superior anterior mediastinum is a deeply red, soft, resilient mass spread over the veins, which may be thymus or intrathoracic thyroid.

Microscopic section of thyroid shows deeply staining very cellular mass roughly arranged in areas by dis-

tinct but not joined septa. Within these areas are illy defined acini containing round, cuboidal and irregular cells fitted with deeply staining small nuclei. Some of the cells are applied to the membrane, others are loose. A distinct basement membrane is often difficult to see, thus suggesting an uncontrolled growth out from the true walls. No colloid seem and none of the orderly packing of fetal thyroid. This is to be considered either as an excessive hyperplasia or as a carcinoma; it resembles some of the malignant adenomata and carcinomata described by Wilson. The mediastinal mass is fairly well defined thymus tissue with Hassall's bodies and a very rich blood supply. Some of the arrangement suggests sinuses in lymph tissue and proliferation is going on around their margins. Follicular arrangement also simulated.

Undulated Grass Parrakeet (*Melopsittacus undulatus*)
♀. Carcinoma of ovary.

Grivet Monkey (*Cercopithecus sabæus*) ♀. Adeno carcinoma of head of pancreas.

Observations by Dr. E. A. Schumann upon Interesting Conditions found in the Female Genital Tract:

American Otter (*Lutra canadensis*). Cystic ovaries and Hydrometra. The body of the uterus is normal although somewhat atrophic. Both cornua are the seat of extensive cystic change. The walls of the cornua are greatly thinned and their diameter about six times normal size. There is a distinct torsion about the middle of each uterine cornua and many distinct blood vessels course over the surface. The left ovary is the seat of a follicular cyst 5 cm. diameter and the flattened out, almost obliterated fallopian tube may be seen spread out over the inner surface of the cysts. The right ovary is converted into a cyst 2 cm. diameter. The right tube is also thinned out and obliterated. Both uterine cornua and ovaries contain clear serous fluid.

Malaccan Porcupine (*Hystrix longicauda*). Scirrhus carcinoma of left mammary gland with metastases to

lung, liver, spleen and kidney. Over and including the left mammary gland is a large ulcerating mass, 8 x 5.5 x 2 cm., discharging to the surface. It extends almost up to the axilla. On section it is made up of a creamy necrotic central mass surrounded by edematous translucent cartilagenous material. It exudes a pus-like material, smears of which show no organisms, only detritus and loose epithelial cells. Microscopic section shows diffuse induration of the gland closely resembling chronic inflammation or intra-canicular fibroma. Mucosa lining the lobules is markedly proliferated. Epithelial cells are large and appear in nests. In certain areas the tumor appears almost of adenomatous type with distinct ducts and marked proliferation of the epithelium.

Snow Leopard (*Felis uncia*). Cystic ovary. The right ovary is the seat of a thin walled cyst of three loculi. The mass measures grossly 4x2 cm.

Pigtailed Macaque (*Macacus nemestrinus*). Tubo-ovarian abscess ruptured into Douglas pouch. The uterus is of the usual normal cordiform type. The left tube and ovary are normal. The right tube and ovary are fused into a mass of fibrinous exudate, pus and adhesions. The mass measures 1 x 2 cm. The cecum has become adherent to the superior aspect of the mass the whole forming a purulent collection which at autopsy filled Douglas pouch.

Dr. Weidman's Report.

The tally of animal parasites this year runs a little high—12 per cent. as against a general average of ten per cent., and against only four per cent. for last year. The increase is not due to any special epidemic, but is a matter of generally increased incidence.

Isolated parasitological incidents that stand out are as follows:

Tapeworms in the Bile Ducts of Cape Hyrax (*Hyrax capensis*). It is a great rarity to encounter the strobile (mature stage) of tapeworms anywhere except in the stomach and intestines. The cases we note are therefore exceptions. We have earlier records of them in the

gall bladder and hepatic ducts of Livingstone's Eland and in the ducts and intestines of two Cape Hyraces. This makes our third case in a Hyrax. Beddard has also seen them in the London Gardens, and identifies the following new species:—*Inermicapsifer capensis*, *Hyracotenia procaviæ*, and *H. hyracis*. Other writers have identified several species, many of which may be separated from each other only by tedious microscopic examination.

Intestinal Blockage from Boluses of Worms. This was noted in a Natal Francolin and a Blackbird. Similarly a bolus of worms was found in the pylorus of two young Aoudads. These findings are worth noting as evidence of the disease-producing capacity of intestinal worms.

Hookworms in the Liver of Giraffe. This is the second time that we have met this condition. The parasite from the first case was named *Uncinaria smithi* as a new species. It induces notable chronic catarrhal inflammation of the bile-ducts with fibrosis around them.

Heterakis distans in Marmosets. Dr. Allen J. Smith identified this hookworm-like parasite occurring in the stomach and cecum of two Pinche Marmosets. This brings up the matter of the worm parasites of monkeys in general. In compiling certain statistics recently it developed that marmosets and squirrel monkeys were much more commonly affected than other kinds of primates.

Verminous Infestation of Monkeys in General. The statistics just referred to brought out that, on the basis of 538 primates examined, the general average of infestation was ten per cent. The following kinds stood in the head of the list (year ending February 28, 1922).

	Number examined.	Number verminous infected.	Per cent.
Squirrel Monkeys.....	8	3	37
Marmosets.....	43	7	16
Sooty Mangabey.....	34	4	12
Cebidæ.....	87	10*	11
Rhesus Macaque.....	60	6	10

* Of these eight showed intraperitoneal filariæ.

This shows that with us the amusing little marmosets and squirrel monkeys are, verminously speaking, the most reprehensible of all primates. The lemures (62 examined) showed a slightly lesser percentage than the primates—eight per cent. Of the marmosets, the black eared and the common ones were practically the only ones affected. The pinche marmosets have shown them for the first time this year. Most of these had been in the garden for a considerable period—at least one year. None died so shortly after arrival as to indicate that the worms must have been brought by the beasts into the garden. In regard to the squirrel monkeys it was just the opposite. Of the three which were infested one had died two days and another fourteen days after arrival.

Periproventricular Filariæ of Birds. Last year we noted fourteen specimens of these worms which tend to coil into masses in the neighborhood of the proventricle of smaller birds. This year the count is twenty-three—a very notable increase. Whereas at first this may seem formidable, a little analysis quickly tempers it. In the first place, death was not due in all cases to the parasite. Two birds had injuries, two others harbored that known pathogen, spiroptera, and a fifth had an acute general infection. In the second place the varieties affected are not birds of especial financial value. To summarize, the infestation is one of small, inexpensive birds and not to be compared to the spiroptera enzootic of parrots. As brought out in last year's report the investigation of this filariasis did not promise well because it would necessitate handling small, nervously unstable birds, and this might entail losses incommensurate with any conceivable benefits. The past year has added but little to our previous knowledge. Unequivocal evidence that these worms produce important disease has been limited this year to (1) the association of a profound anemia in one bird, a silver-eared liothrix, (2) a ruptured inferior vena cava in a bulbul and (3) associated subserous cysts of the intestines in a weaver.

There are certainly two different species, possibly families, of worms concerned—a shorter, about an inch long and easily dissected out, and a larger about four inches long and inextricably coiled. In some instances microfilaria have been definitely absent from the blood and in others present.

An analysis of the duration of the birds residence in the garden did not yield any pertinent information. Some of the birds had been here up to eight years and one only twenty days. All that we can derive from this is that some at least of the cases are importations.

Whereas this problem is most fascinating biologically, I feel, as I did last year, that at present it is not an economic one, and to be dealt with slowly—feeling our way, and not by more or less heroic, heavy-handed clinical methods.

Avian Spiropteriasis. In the past years this pest was considered under the heading of “Spiroptera incerta.” This year I encountered a case where the female worm was different (microscopically) and therefore of a different species. This suggests that several species may be able to produce this avian infestation and since the hygiene is the same, we must group them under one head until final study settles all the varieties.

The effect of finding multiple species of spiroptera will be to complicate certain phases of our investigative work; in order to trace the course of an infestation it will be necessary to identify each infestation microscopically as to species. The appearance of the ova is the same, however, in the several species, and this leaves the detection phase unchanged.

The birds affected this year represent several new hosts. They were: Sun Bittern, Blue-crowned Conure, Mexican Crested Hangnest, Canary, Red wattled Plover, American Bittern, Chestnut-eared Finch. All of these came from the bird house, except the Conure and American Bittern. The two exceptions came from the Parrot House. The cage distribution in the bird house is not significant of any especially infected cages.

Scabies in Orang "Ayesha." Upon arrival, the skin over this animal's back was moderately scaly, the hairs largely rubbed off, and she scratched more than a normal monkey should. The distribution of the disease was not at all that of human scabies. There were no burrows or other distinctive features. A microscopic examination of skin scrapings disclosed the arachnid (*Sarcoptes scabiei*) which is the cause of scabies, and several of its ova. The next question was "Where did she contract it?" Inasmuch as the corresponding parasite of several animals (dog, horse, etc.), closely resembles the human, I compared the orang mite with 35 human specimens and found it identical with them. Furthermore, the orang's keeper has also developed a severe type of scabies, and in turn, also his wife. This summation of evidence proves that the orang's disease was of human type etiologically, although not so clinically. Both the keeper and the orang have quite recovered under treatment.

Yeast Commensalism in Axilla of Pigtailed Macaque. This monkey died with a pelvic abscess. The axillary condition was unimportant and would escape mention were it not analogous to a bland human dermatosis—*tinea versicolor*. The skin in both axillæ was covered by a thin, yellow scale; and dandruff-like flakes lay in the hair. Microscopically the scales were largely made up of yellow yeast cells and a yellow yeast was obtained in culture.

Respectfully submitted,

HERBERT FOX,
Pathologist.

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 UNDER AN ACT OF THE
 General Assembly of the State of Pennsylvania.

APPROVED

MARCH 21, 1859.

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